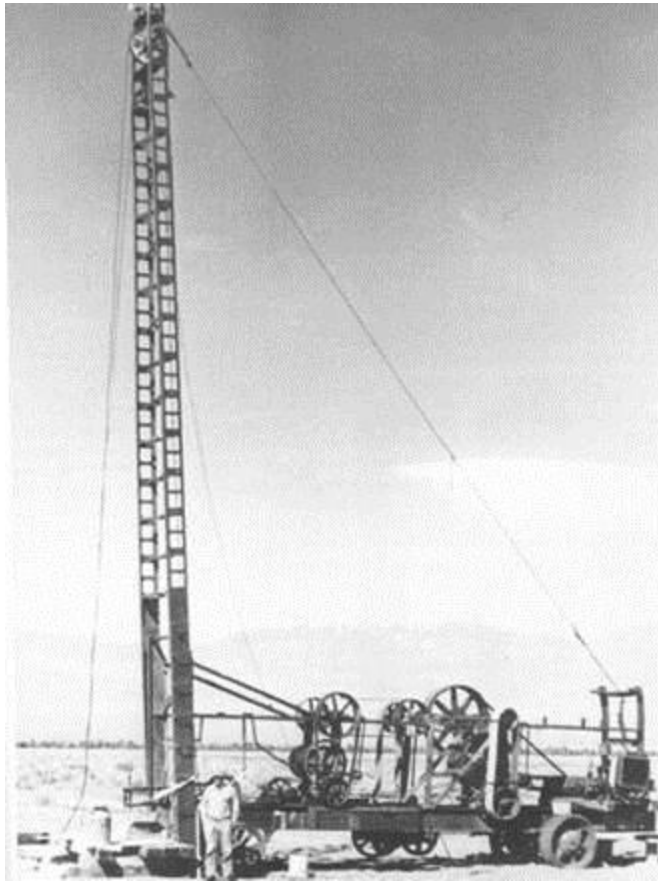




State of Nevada

Division of Water Resources

Office of the State Engineer



Pahrump Valley Water Resource Management
October 2, 2012

Introductions



- Jason King, State Engineer
- Kelvin Hickenbottom, Deputy State Engineer
- Rick Felling, Chief of Hydrology
- Hamilton Reed, Basin Engineer
- John Guillory, Senior Engineer – Las Vegas
- Bob Dennis, Basin Inventory



Why Are We Here?

- **Pahrump Basin is over-appropriated and over-pumped**
- **Water levels continue to decline**
- **Explore options to minimize any adverse effects of ground-water pumping in the basin**
- **Discuss available tools to bring the basin back into balance**
- **Listen to residents and water users concerns**



Agenda

1. Administration of Groundwater in Nevada
2. Hydrology Overview
3. Perennial Yield of Pahrump Valley
4. Existing water rights
5. Pumpage Inventory
6. Water Table Drawdown
7. Decisions and Orders of the State Engineer in Pahrump
8. Management of the Basin – Options
9. Summary
10. Open Discussion on Future Management of Pahrump Valley

Prior Appropriation Doctrine

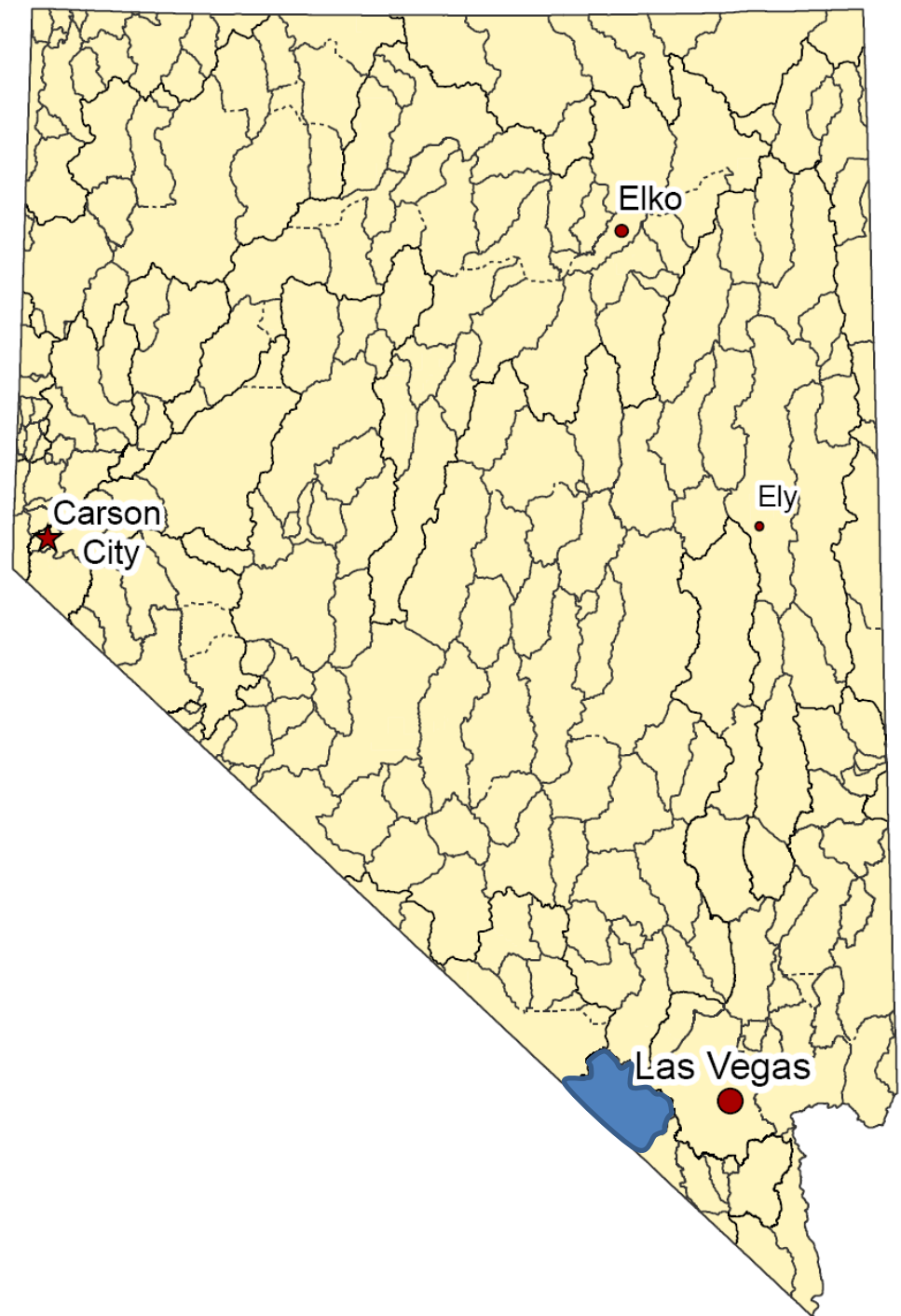


- First in time, first in right
- Beneficial use is the basis, the measure and the limit of the water right
- Use it or lose it
 - Water rights can be
 - Cancelled
 - Forfeited (groundwater only)
 - Abandoned

Groundwater

State divided into 256 hydrographic basins and sub-basins.

Each basin is administered separately.





Groundwater

- **Groundwater Basins are Managed Based on the Perennial Yield Concept:**

The maximum amount of ground water that can be used each year over the long term without depleting the ground-water reservoir.

- **The goal is to appropriate water up to the perennial yield of a basin.**

The perennial yield has been exceeded in Pahrump Valley.

PRECIPITATION AND GROUNDWATER RECHARGE



EVAPOTRANSPIRATION



SUBSURFACE OUTFLOW

NV

CA



Conceptual View of Groundwater Flow

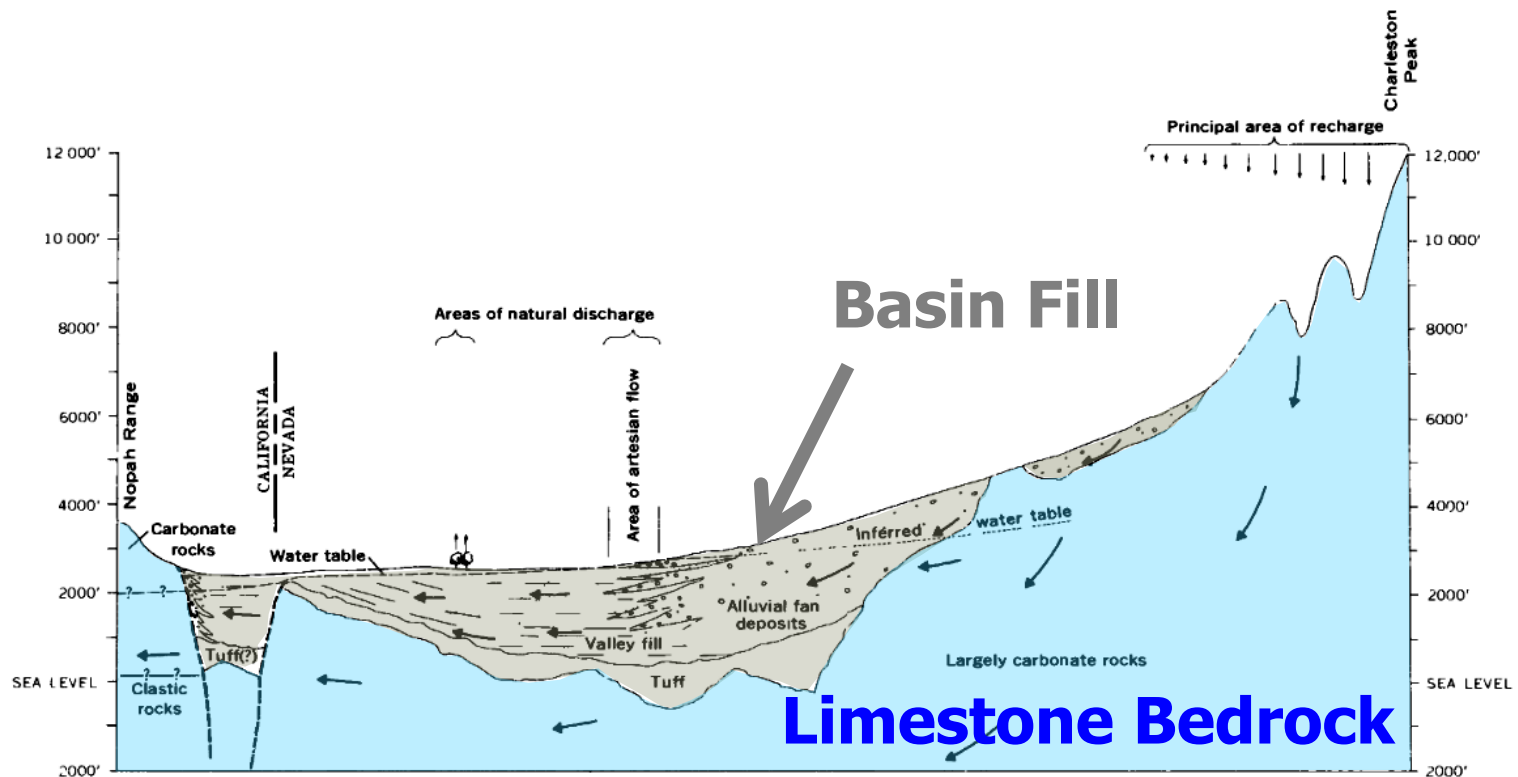


FIGURE 5.—Principal topographic, geologic, and hydrologic features of Pahrump Valley, as shown in section from Charleston Peak to the Nopah Range.

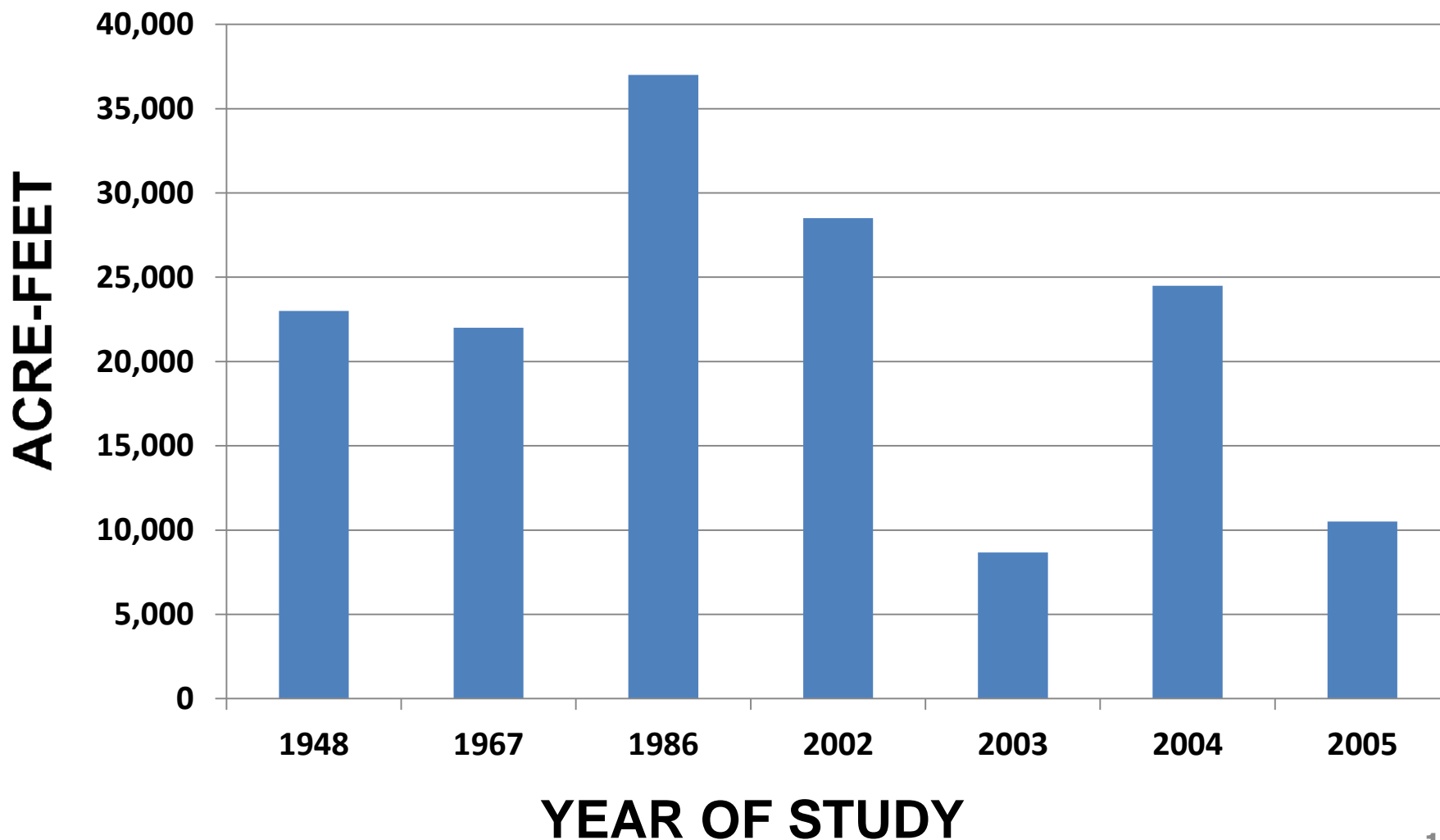
Malmburg, 1967

Perennial Yield

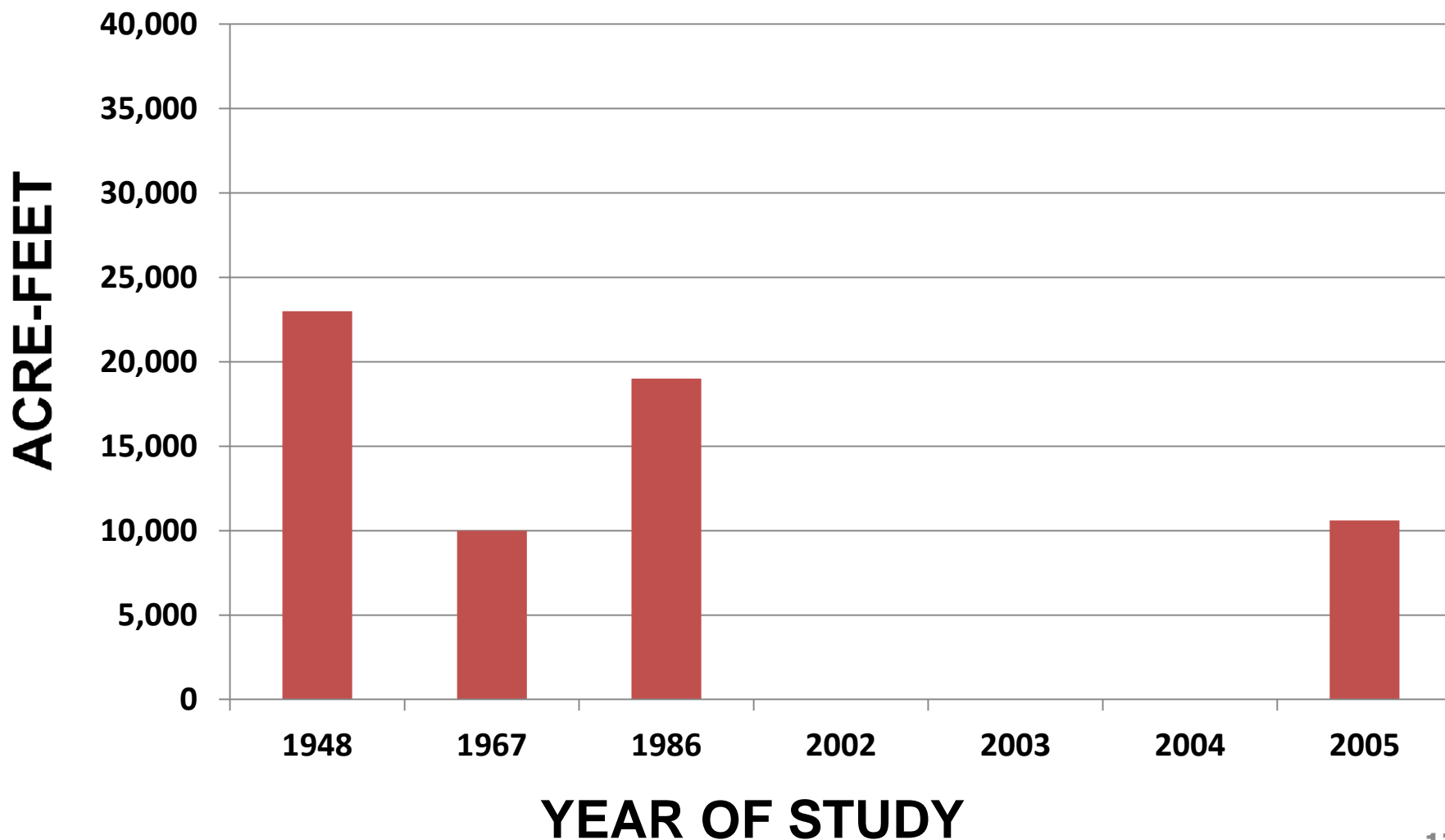


- Recharge in the basin is $\sim 20,000$ to $30,000$ AFA
- (Predevelopment) ET about $12,000$ AFA
- The remainder is lost by subsurface flow in limestone bedrock to CA
- Perennial yield of the basin is $12,000$ AFA

Pahrump Basin Recharge Estimates



Pahrump Basin ET Estimates





Existing Groundwater Rights

<u>Manner of Use</u>	<u>Acre-Feet</u>
Commercial	1,038
Domestic	7,105
Irrigation	15,442
Municipal and QM	38,156
Other	799
Total Water Rights	62,540
Existing domestic Wells = 11,106	5,553
Potential New Domestic Wells = 8,500	4,250
Total Potential Pumpage	72,343

Pahrump Well History



- First well drilled in 1910, (unsuccessful)
- In 1916 there were 28 wells existing, 15 of which were flowing
- Currently there are over 11,000 wells
- Current pumping at 60-year low



Historical Pumping

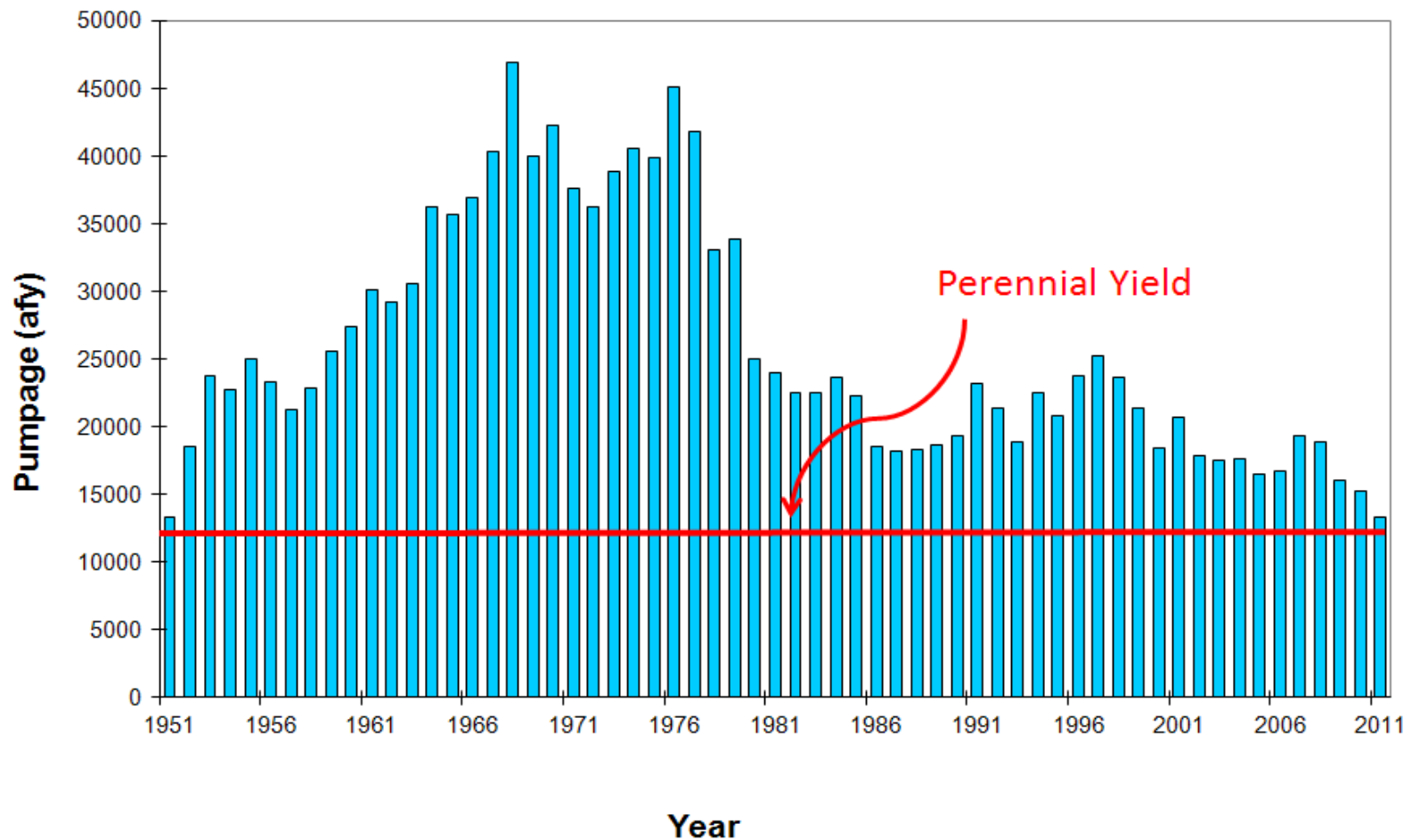
GROUNDWATER PUMPAGE INVENTORY PAHRUMP VALLEY, NO. 162 2011

IRRIGATION	2442 Ac-Ft
UTILITIES, INC. [Includes Lakeview Golf Course (formerly Executive), Willow Creek Golf Course (formerly Champion), commercial, irrigation, domestic and line losses]	3490 Ac-Ft
COMMERCIAL AND OTHER USES NOT ON UTILITIES, INC.	1179 Ac-Ft
QUASI-MUNICIPAL NOT ON UTILITIES, INC.	504 Ac-Ft
DOMESTIC NOT ON UTILITIES, INC. Domestic wells drilled in 2011 = 7 Domestic wells plugged in 2011 = 1	5553 Ac-Ft
NO PERMITS OR CERTIFICATES	184 Ac-Ft
TOTAL	13,352 Ac-Ft



Pumping

Pahrump Annual Pumpage





Effects of Over-pumping

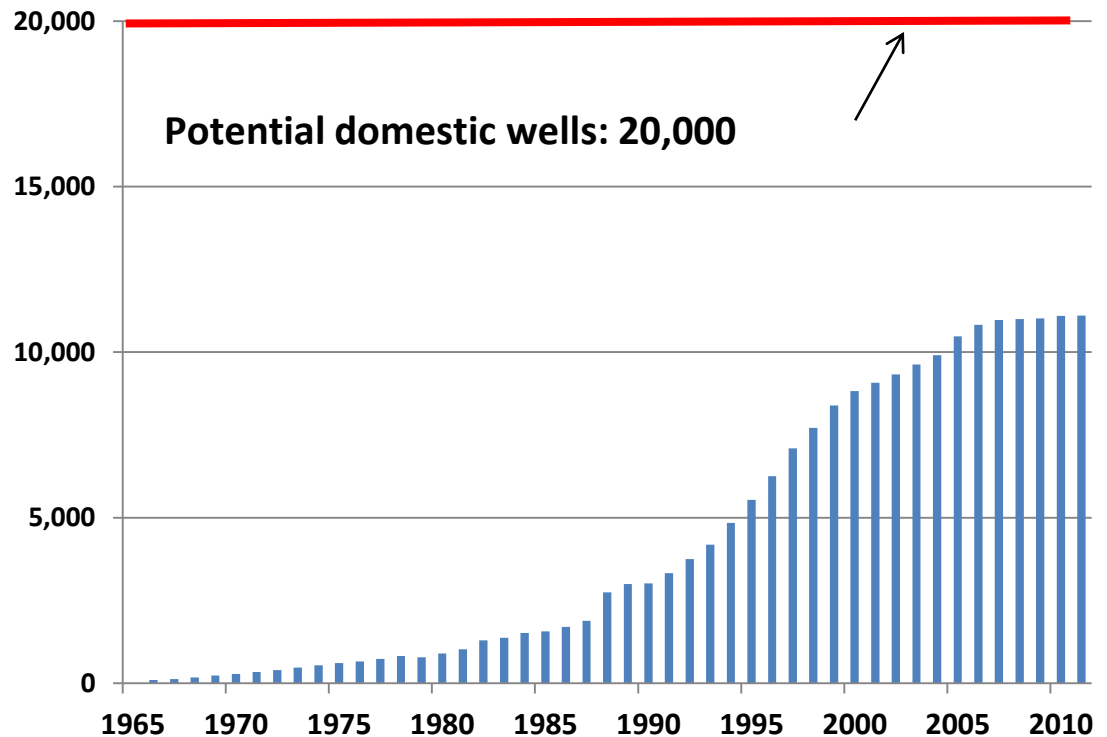
- Excessive water-level decline
 - Increased pumping lifts
 - Dry wells
 - Conflict with existing rights
- Subsidence
- Depletion of aquifer

Domestic Wells

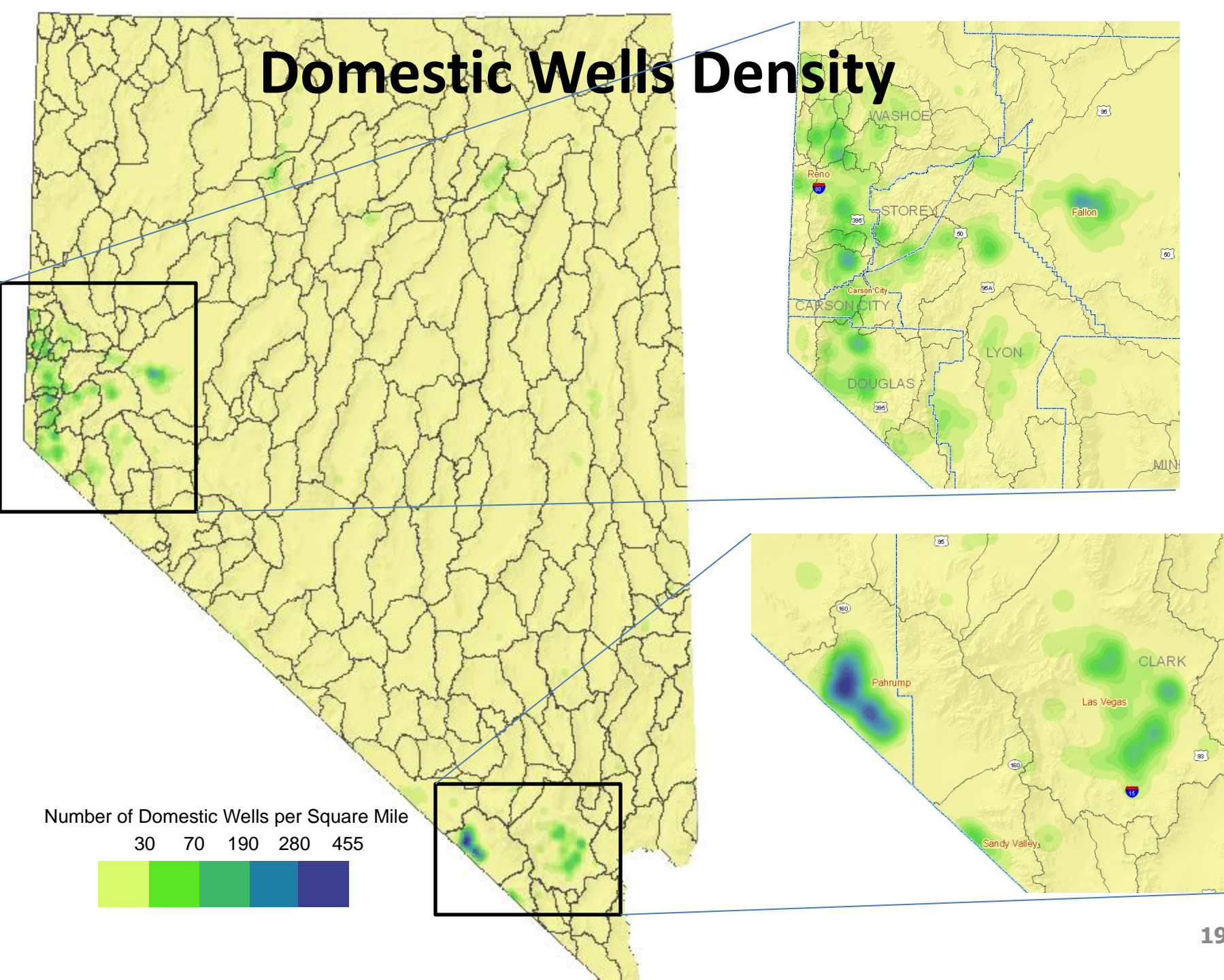


Domestic Wells in Pahrump

- Number of domestic wells increased dramatically from late 1980's to 2005
- More drawdown expected in areas of highest density



Domestic Wells Density



Water Level Trends



- 30 to 60 feet of water level decline across the valley
- Reduced pumpage having positive effects in some areas
- Recovery in wells closer to the fans
- Steady decline to the west and south on valley floor

Water Level Trends



162 S19 E53 15DB 1

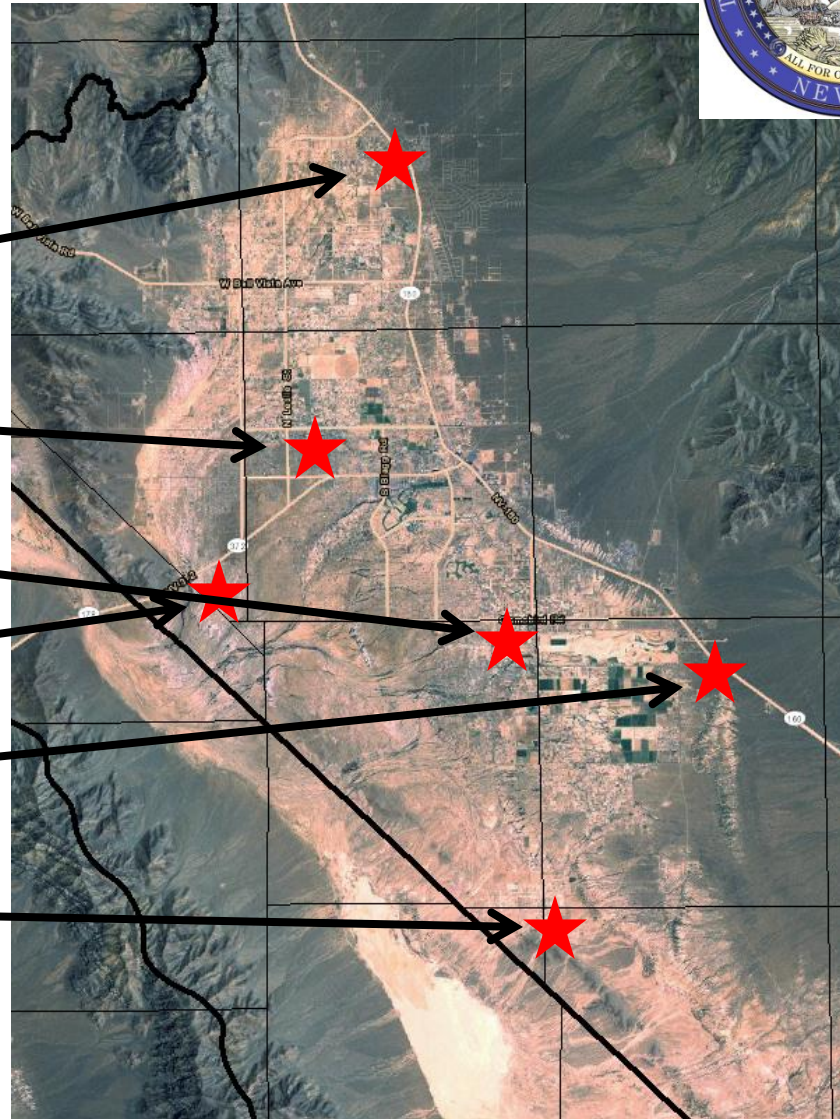
T20S, R53E, S17 Comp

T21S, R53E, S12 Comp

162 S20 E52 36BD 1

162 S21 E54 10AAC 1

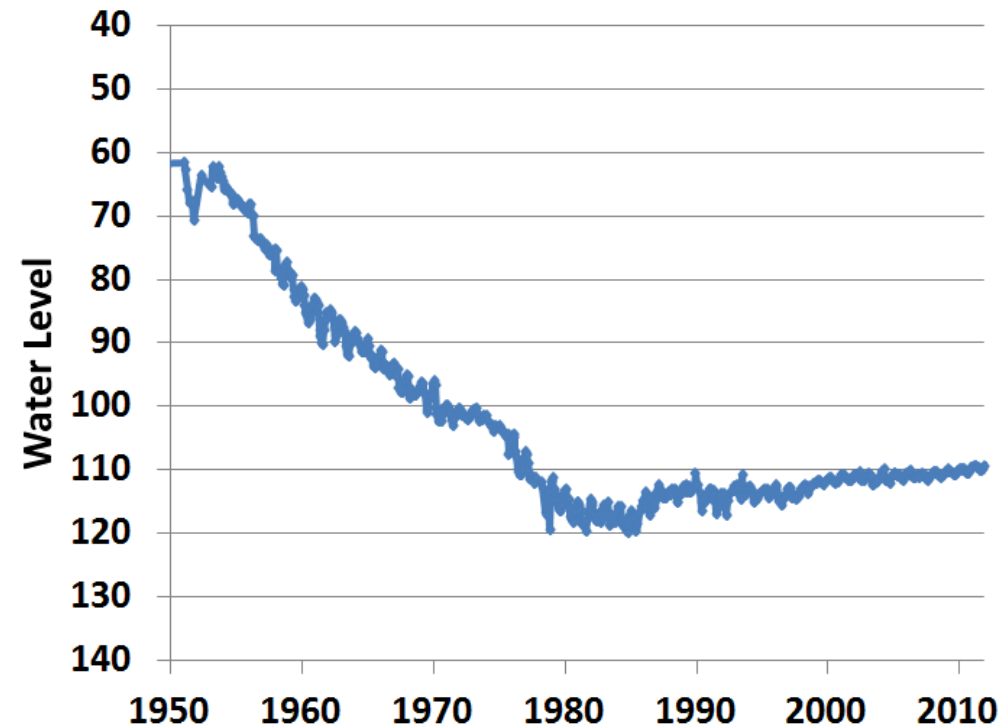
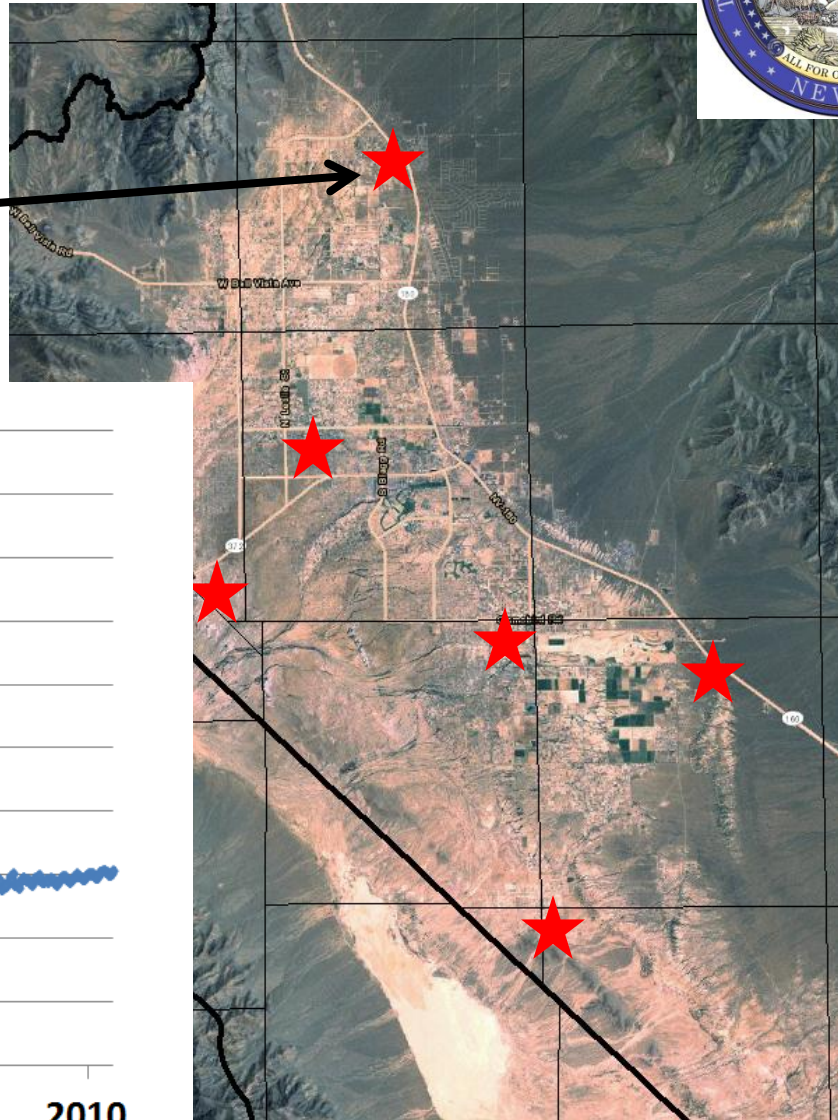
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Water Level Trends



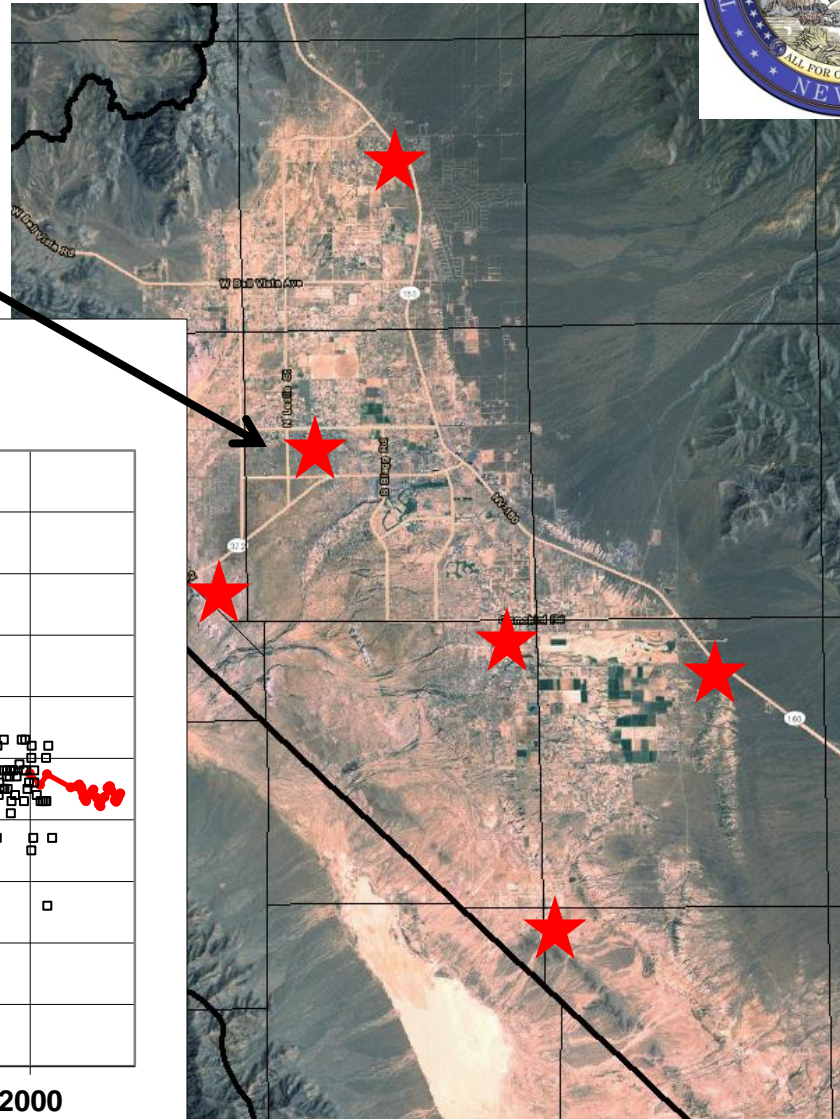
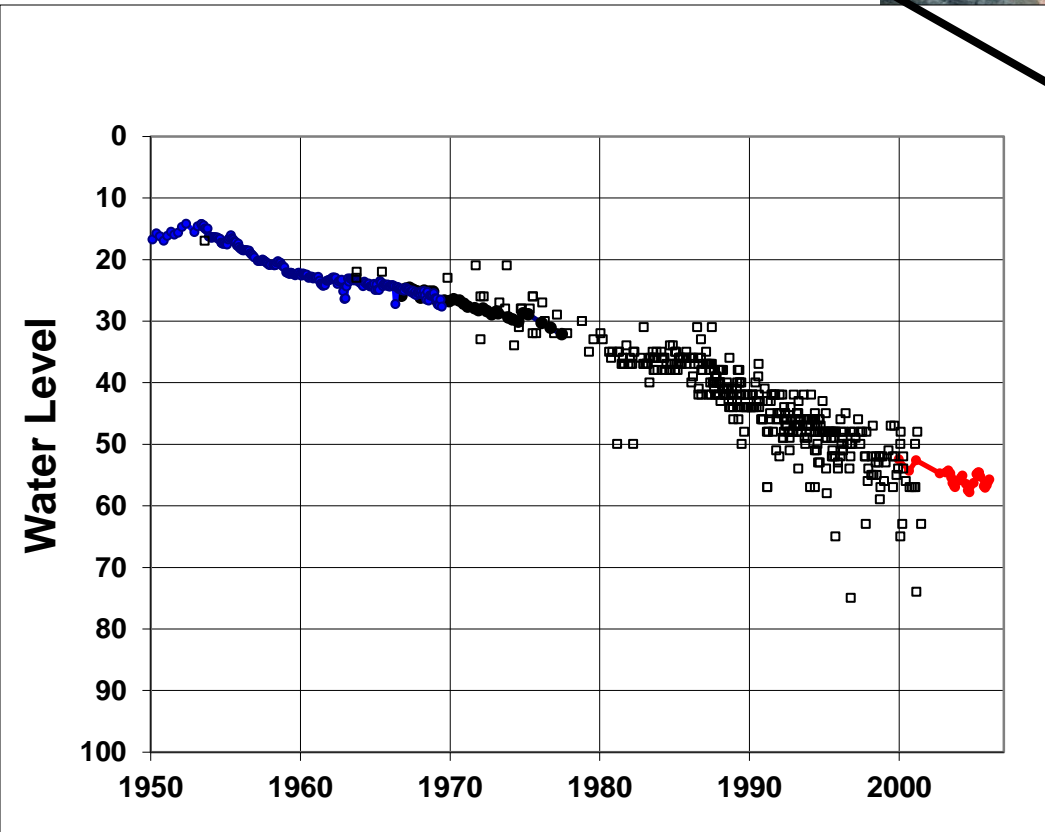
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Water Level Trends



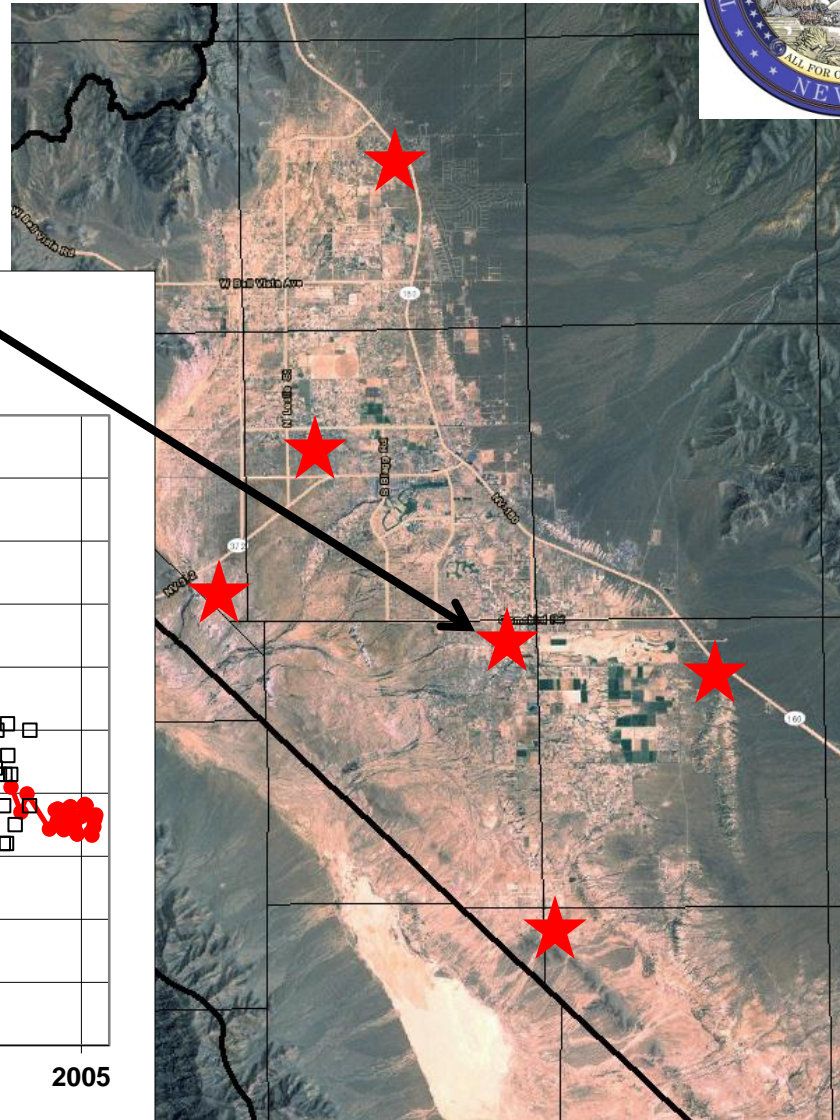
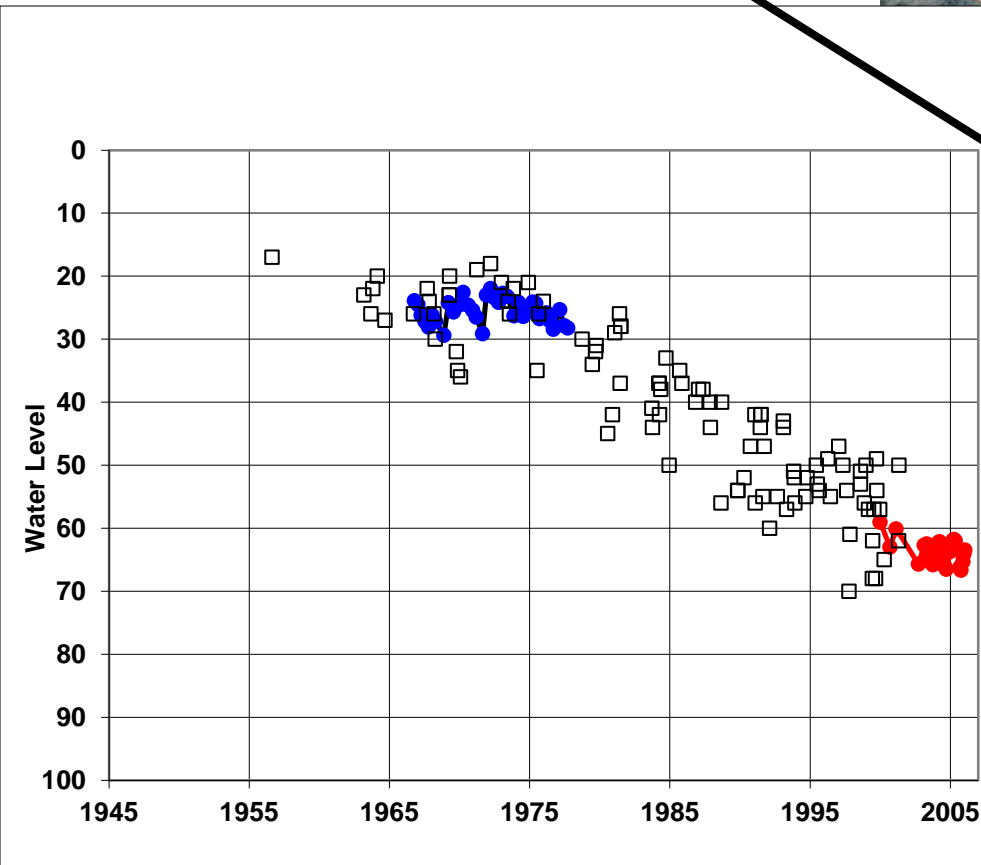
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Water Level Trends



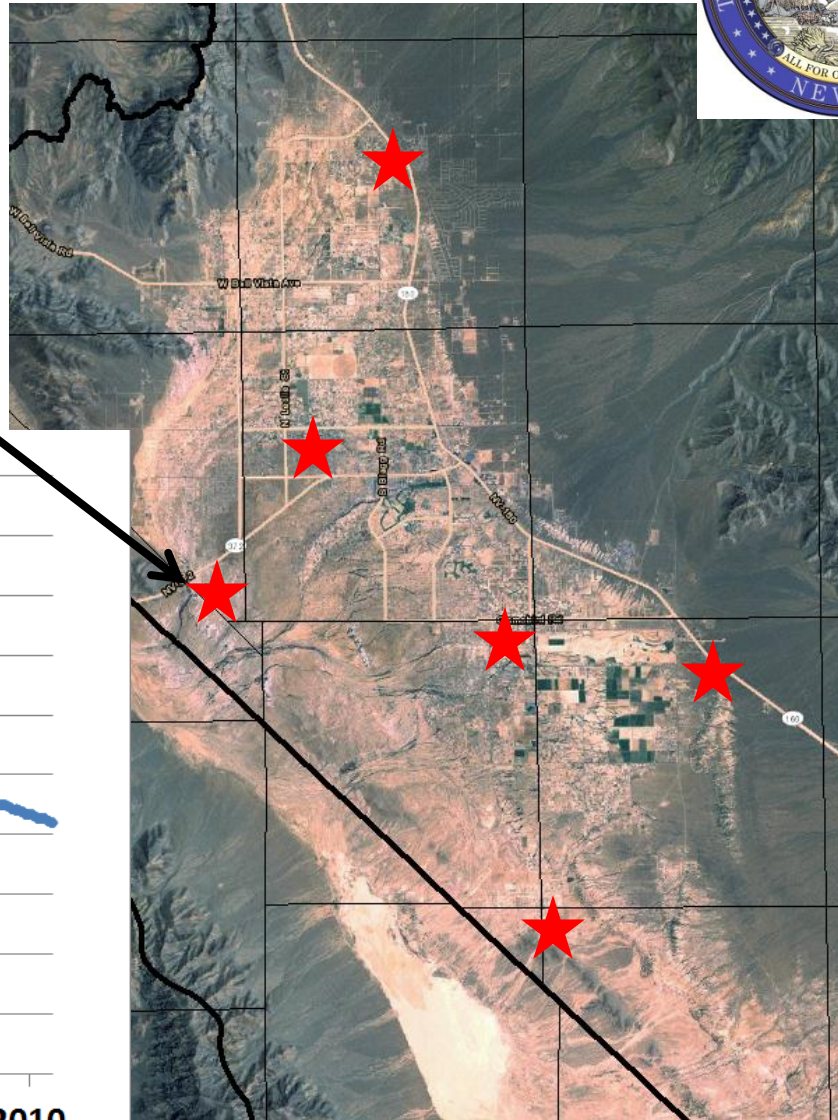
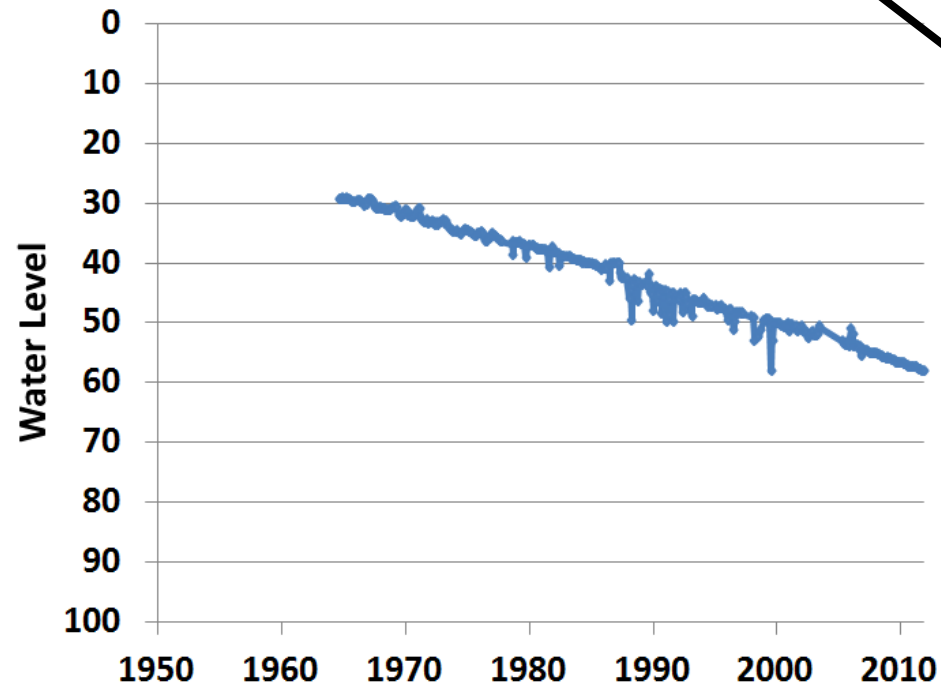
T21S, R53E, S12 Comp



Water Level Trends



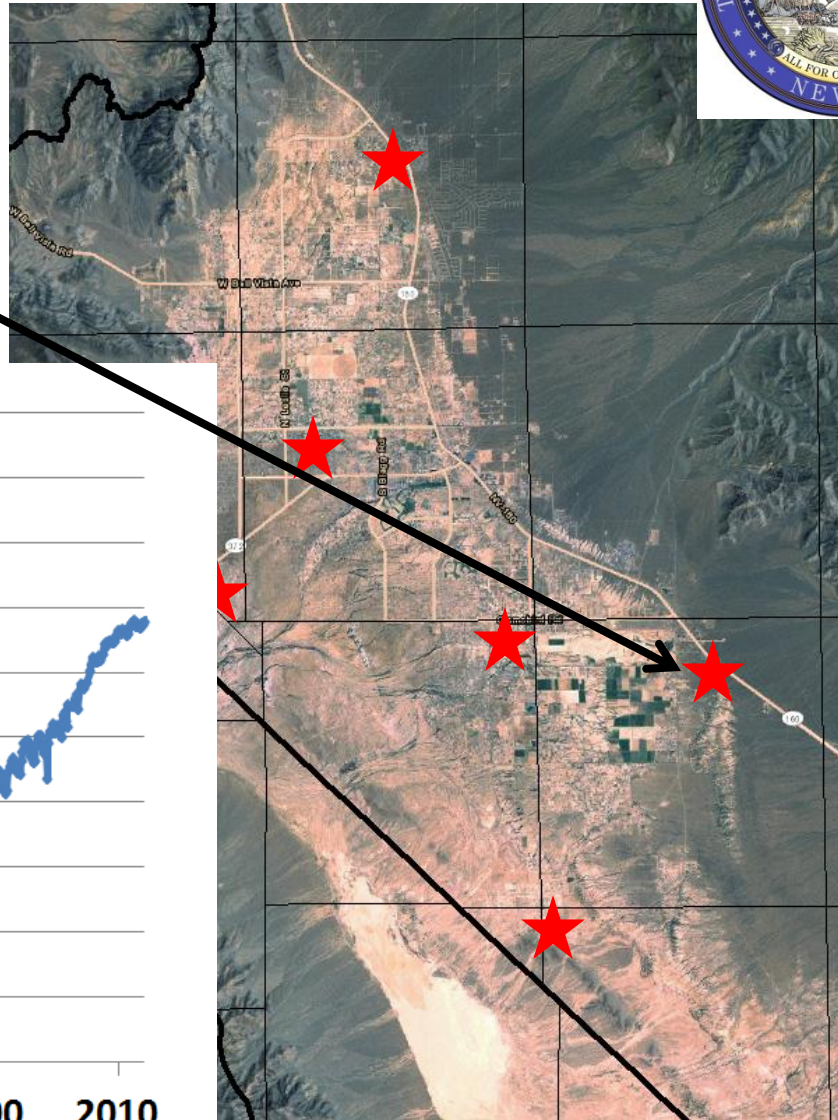
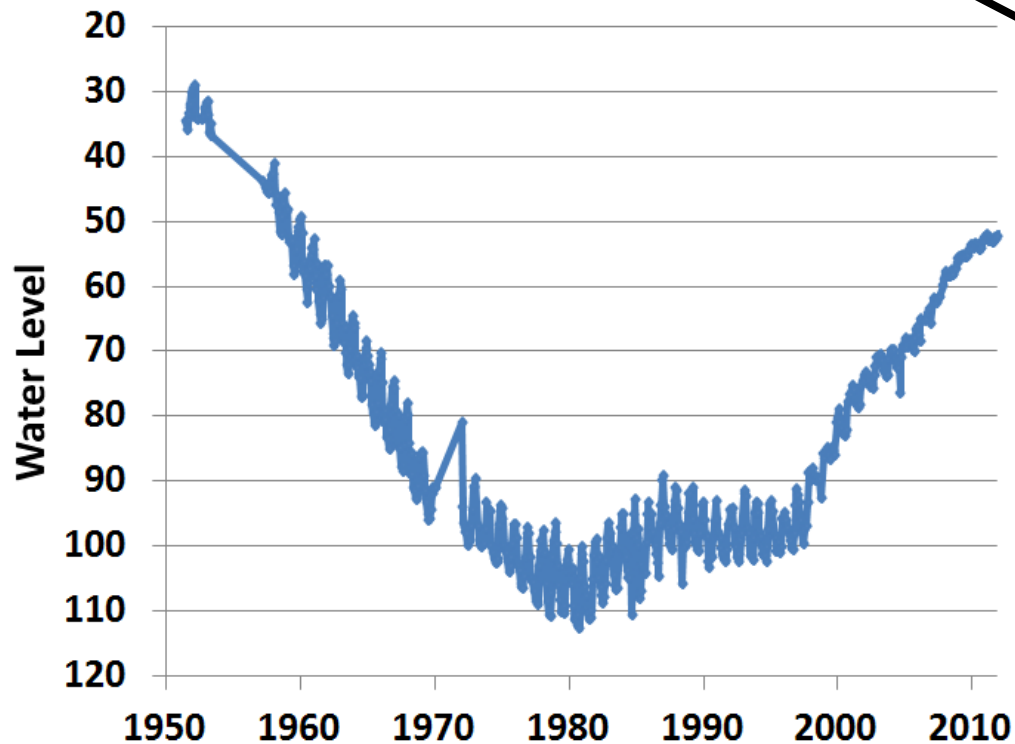
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Water Level Trends



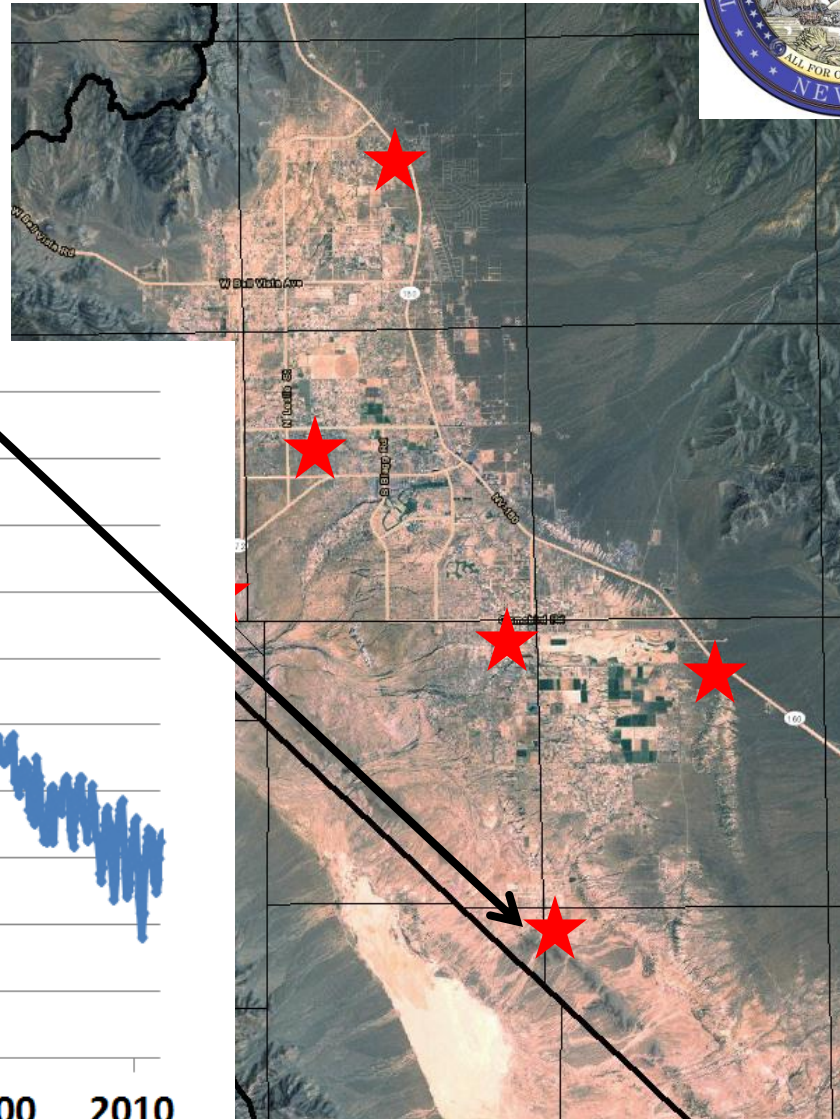
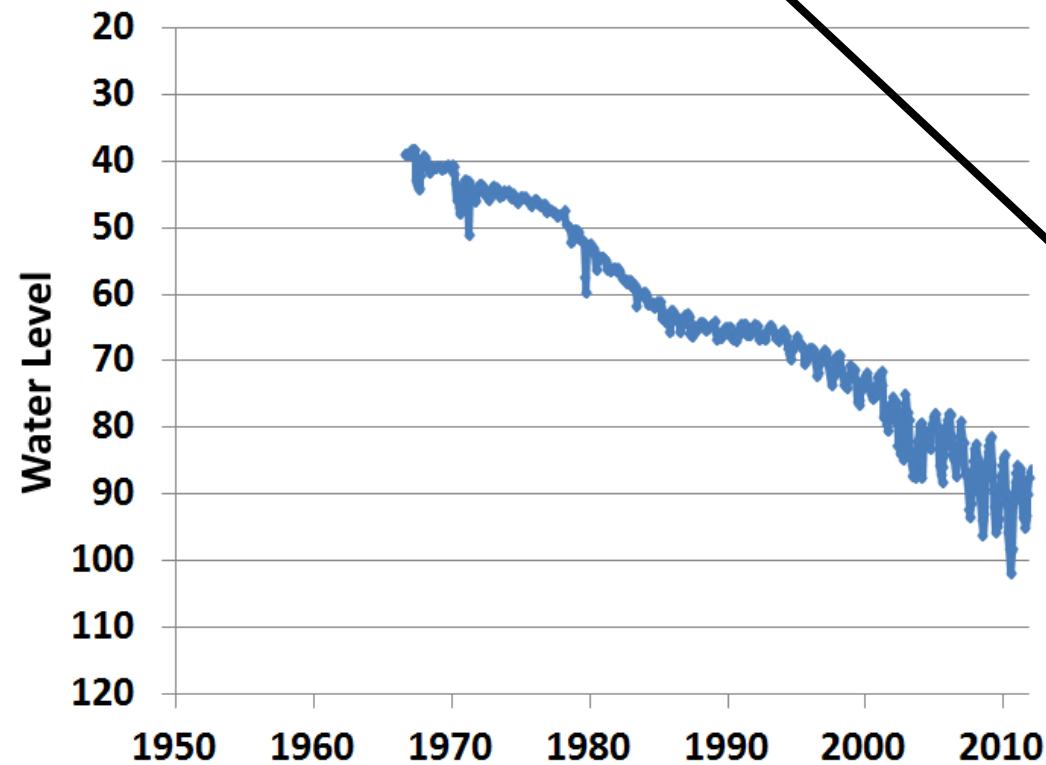
162 S21 E54 10AAC 1



Water Level Trends



162 S22 E53 01DA 1

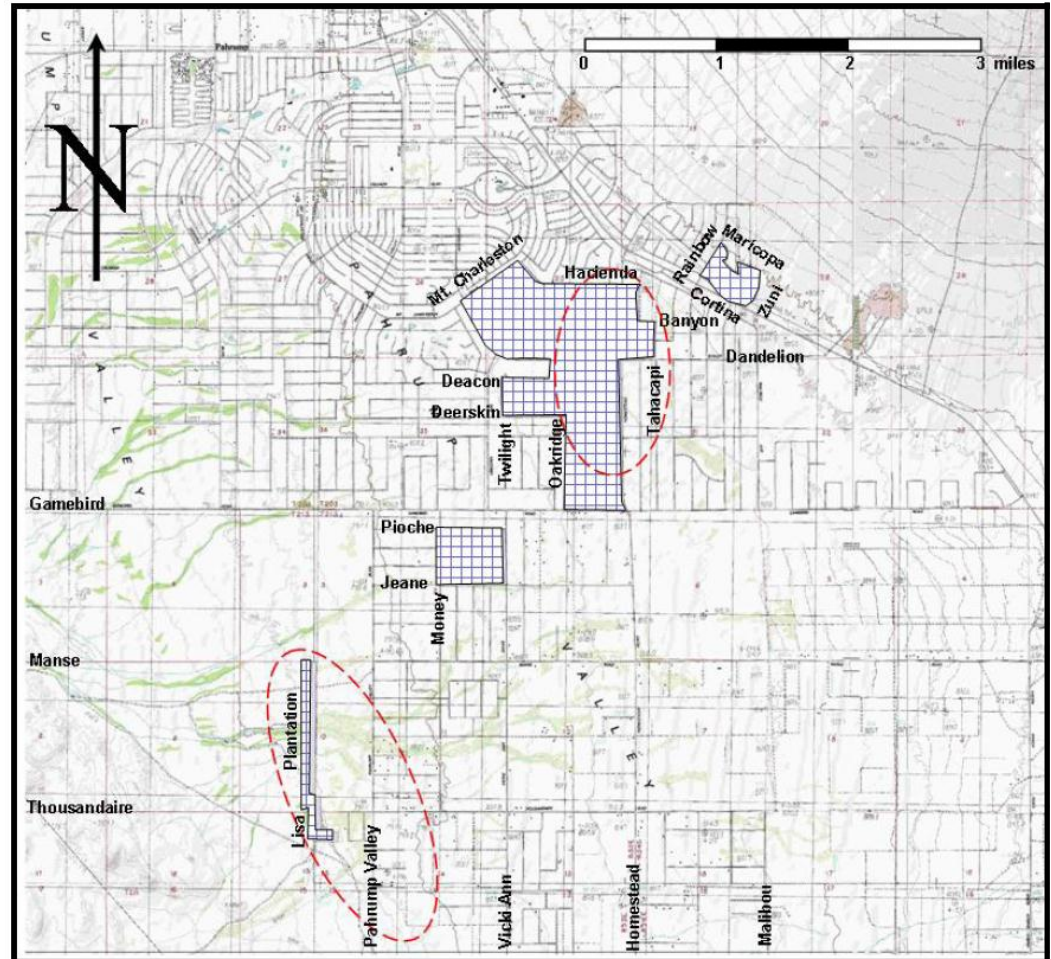


Subsidence



Two Separate Concerns

- Regional Subsidence
 - Heavy pumping
 - Water table decline
 - Fine sediments
- Localized Subsidence and Collapse Features
 - Hydro-collapsible soils
 - Variable compaction
 - Drainage
 - Tectonics/faults



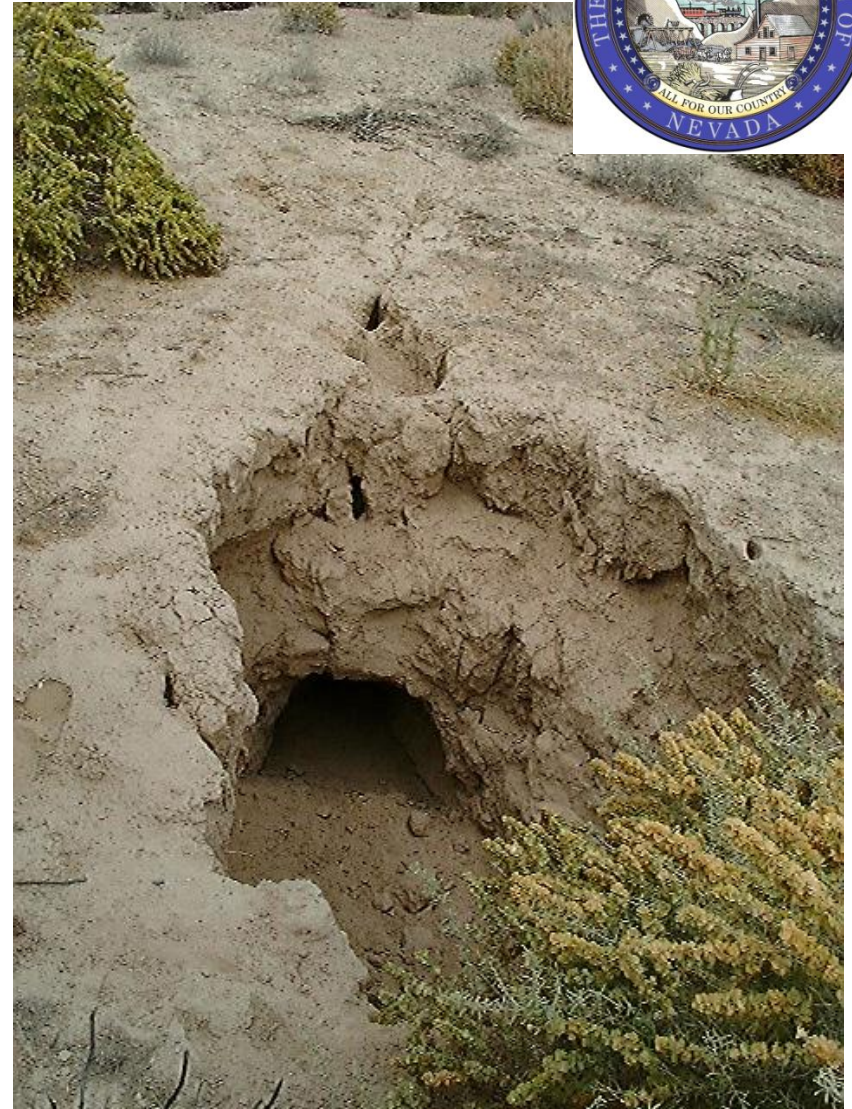
Subsidence Related Problems



Buqo, 2005



Subsidence Related Problems



Pahrump - October 2000

What has the State Engineer done in the Pahrump Basin?

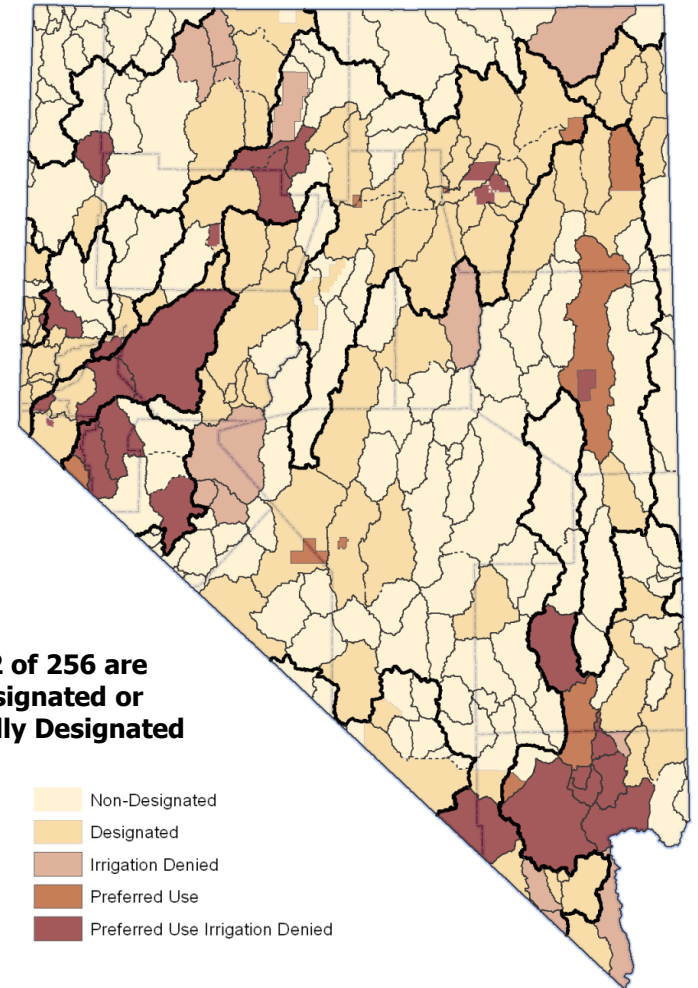


- State Engineer has taken numerous actions to minimize pumping and control drawdown
 - Designated the basin
 - Restricted new permits
 - Restricted transfers from off fan to on fan
 - Required relinquishment or transfer of existing water rights for subdivision approval
 - Recommended against further parceling w/o water right relinquishment
 - Required utilities to acquire water rights in excess of dedication rate
 - Forfeited water rights for non-use

Designated vs. Non-Designated Ground-Water Basins



- Designating a basin enables the State Engineer to impose additional conditions and restrictions on water use.
- A designated basin is not necessarily closed to additional appropriations. Preferred uses of water may be allowed; e.g., commercial, industrial, typically for minimal amounts.



Designation of Pahrump Valley



- The authority for the State Engineer to designate groundwater basins in need of further administration is granted under NRS 534.030
- State Engineer designation orders in the basin and subsequent expansion of the area:
 - Order No. 176 1941
 - Order No. 193 1948
 - Order No. 205 1953

Designation of Pahrump Valley



- NRS 534.120 allows the State Engineer to make additional rules and regulation:
 - Order No. 206 (1953) required measuring devices on wells
 - Order No. 381 (1970) no new appropriations for irrigation
 - Order No. 955 (1987) restricted new appropriation to valley floor and 5,000 gpd
 - Order No. 1107 (1994) further limited appropriations to small commercial and industrial (non-living) to 1,800 gpd
 - Order No. 1183 (2007) domestic well credit

Future Management of Pahrump's Water Resources



What are the options?

- Do nothing
- Administer basins by priority date NRS 534.110 (6)
...where it appears that the average annual replenishment to the ground water supply may not be adequate for the needs of all permittees and claimants, and if his findings so indicate, the State Engineer may order that withdrawals be restricted to conform with priority rights.
- Call for Proofs of Beneficial Use
- Designate the basin as a **critical management area** pursuant to NRS 534.110(7)

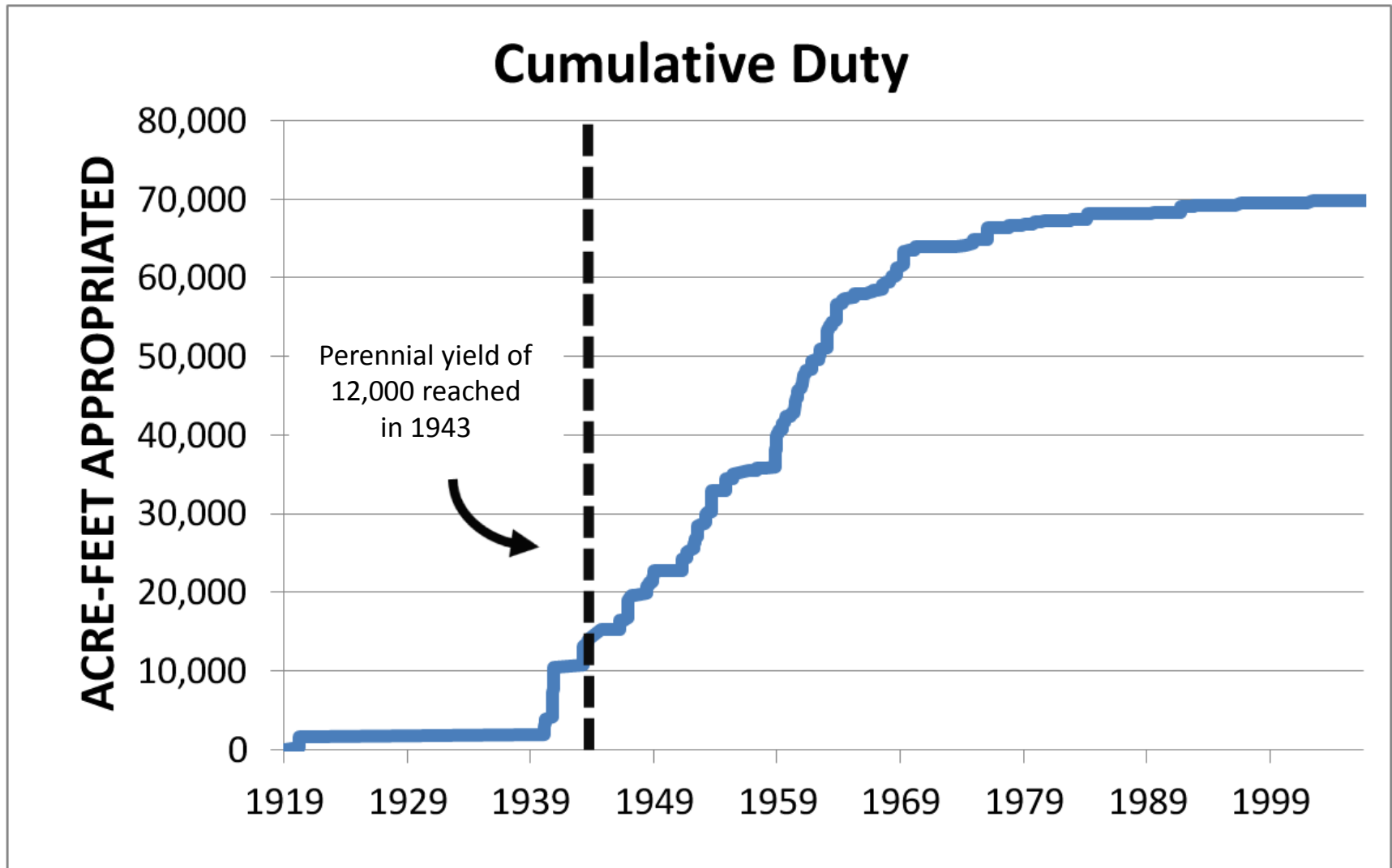


Regulation by Priority

What does administering the valley on a priority date basis mean?

- Groundwater pumping in the valley would be limited to the annual perennial yield of 12,000 acre-feet.
- Water rights with priority dates later than 1943 would be subject to regulation.
- Domestic Wells have a “priority” of the date they were drilled, and would have similar restrictions (NRS 534.080), and almost all were drilled after 1943.

Groundwater Rights by Priority



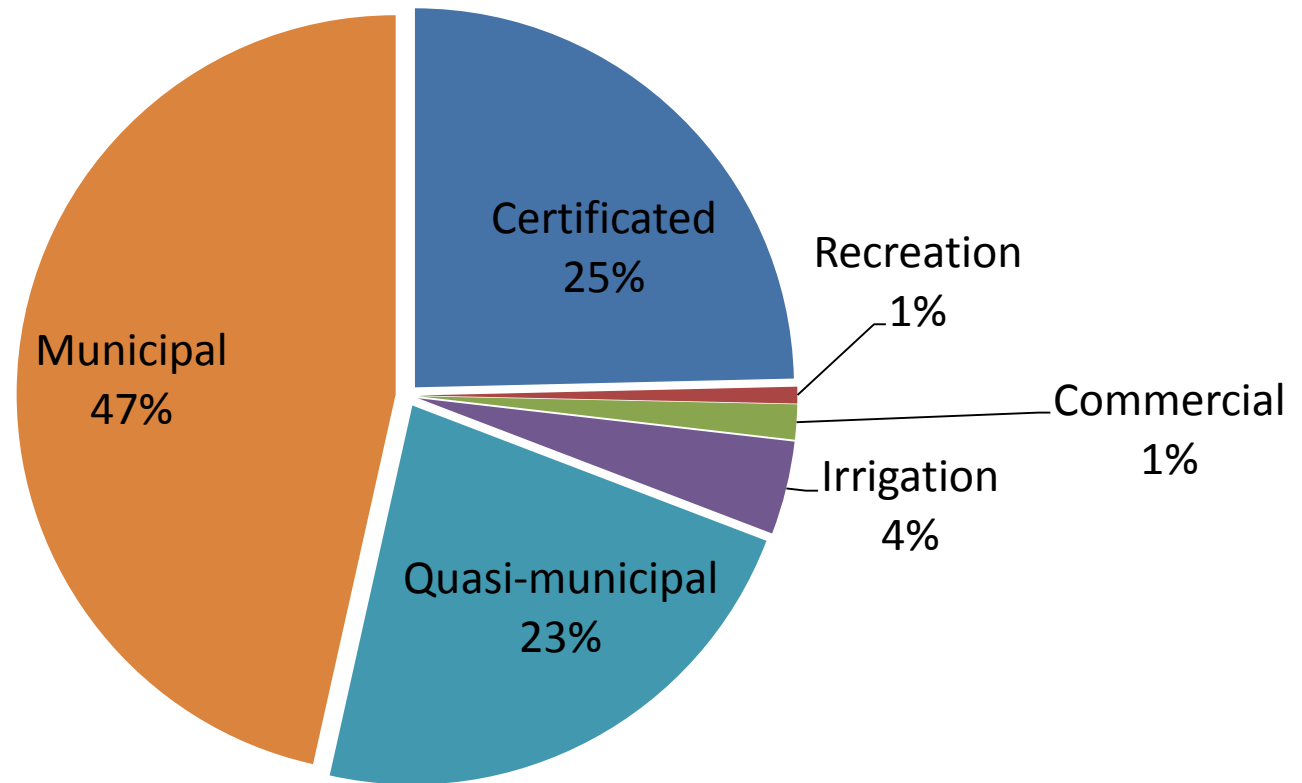
Call for Proofs of Beneficial Use



What does a call for beneficial use mean?

- A permit is not perfected until it is certificated.
- Permits are typically not certificated until full permit duty is pumped.
- A call for beneficial use means the Permittee must submit pumpage records for whatever has been pumped.
 - The permit will be certificated for the amount pumped even if it is not full permit duty.
 - The difference between the permit and certificated duty will be returned to groundwater source.

Call for Proofs of Beneficial Use



Critical Management Area



NRS 534.110(7) The State Engineer:

- a) May designate as a critical management area any basin in which withdrawals of groundwater consistently exceed the perennial yield of the basin.
- b) Shall designate as a critical management area any basin in which withdrawals of groundwater consistently exceed the perennial yield of the basin upon receipt of a petition for such a designation which is signed by a majority of the holders of certificates or permits to appropriate water in the basin that are on file in the Office of the State Engineer.

Critical Management Area



NRS 534.110(7):

The designation of a basin as a critical management area pursuant to this subsection may be appealed pursuant to NRS 533.450. If a basin has been designated as a critical management area for at least 10 consecutive years, the State Engineer shall order that withdrawals, including, without limitation, withdrawals from domestic wells, be restricted in that basin to conform to priority rights, unless a groundwater management plan has been approved for the basin pursuant to NRS 534.037.

Groundwater Management Options



- Heavily dependent on future growth
- Address domestic well issue
- Retirement of existing rights
- Interconnection of systems
- Consolidation of utilities
- Distribution of production wells
- Increased dedications for parceling and subdivisions
- Ordinance requiring xeriscaping
- Import water from other basins
- Use a groundwater flow model as a planning tool
- Develop water in other parts of the valley



Summary

- The problem isn't going away.
- Stakeholders (Pahrump, Nye County and State Engineer's Office) need to ACT NOW.
- Best interest of stakeholders to be an integral part of the solution - not wait for State Engineer's office to begin regulating on priority.
- Domestic wells need to be addressed – city, county and state statutory changes?
- Critical Management Area designation needs to be seriously considered.



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**Thank You
Questions?**

Visit us on the Web

<http://water.nv.gov>

Number of Wells Drilled Annually in Pahrump Valley

